

The National Geographic Magazine

AN ILLUSTRATED MONTHLY



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ADMISSION

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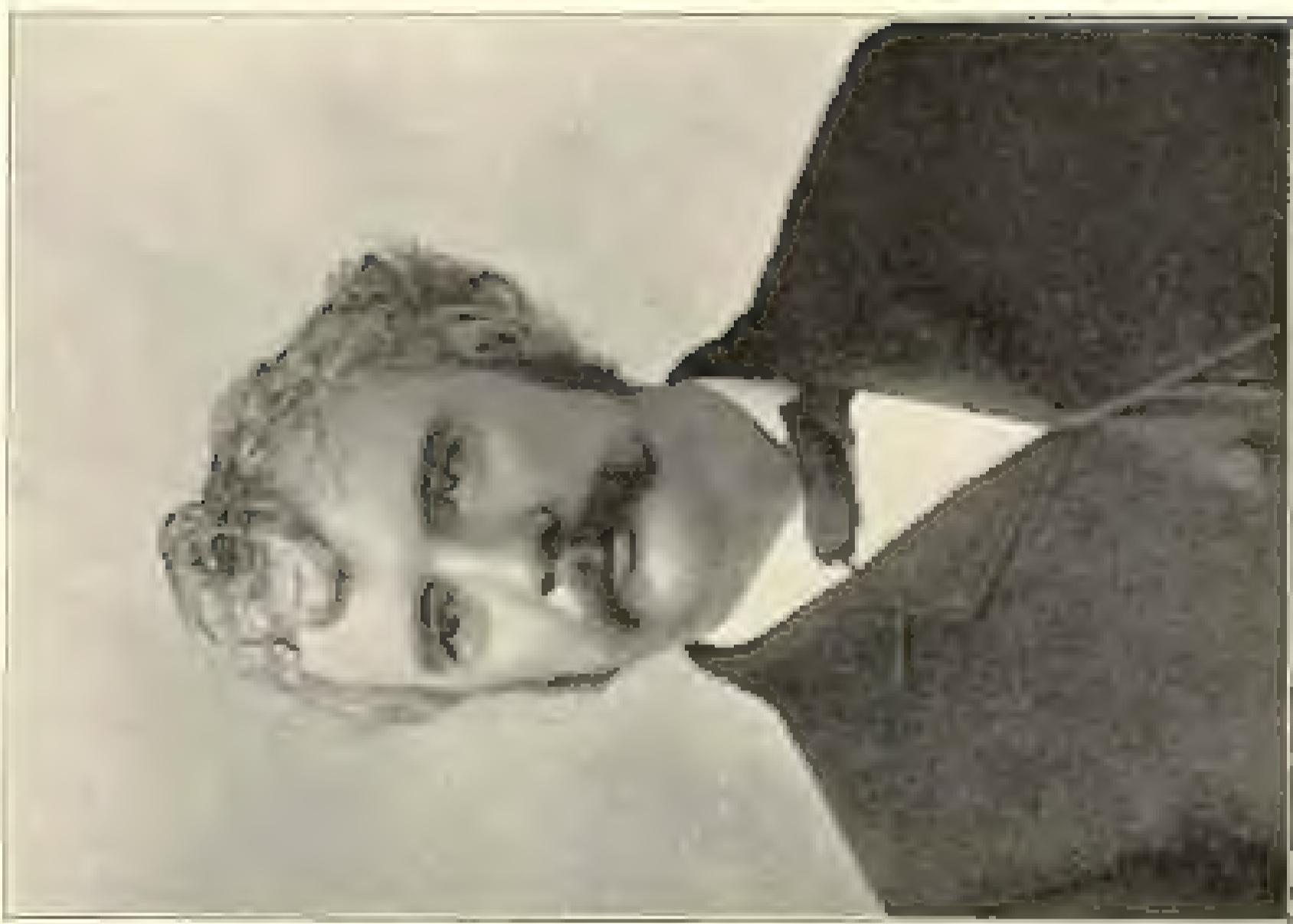
THE
NATIONAL GEOGRAPHIC SOCIETY
—
SPECIAL ANNOUNCEMENT

To fill the vacancy in the presidency caused by the lamented death of Mr Gardner G. Hubbard, General A. W. Greely, U. S. A., has been designated by the Board of Managers as Acting-President. At some personal inconvenience General Greely has acceded to the request of the Board, but has intimated that his official and other duties will render it impossible for him to serve the Society in this capacity for more than a short time.

The Board of Managers have accepted the resignation of Mr Everett Hayden as Recording Secretary. Mr Hayden still remaining a member of the Board. To fill this vacancy Mr F. H. Newell, a former secretary, has been designated, it being the intention of the Board to employ as Assistant Secretary some person who is qualified not only to perform the clerical duties of the position, but also to relieve the editors of the Magazine by acting as business manager of that publication.

The Society's office has been removed to Room 33, Ohio National Bank Building, on the northwest corner of Twelfth and G Streets N. W. In these more commodious quarters it is expected to so arrange the Society's Library as to make it available to visiting members and their friends. The transaction of business will be facilitated by the addressing of mail to the undersigned at the above address.

F. H. NEWELL,
Secretary



Portrait of a man

Attributed to the German painter
Ludwig von Hofmann



Portrait of a man

Attributed to the French painter Jean-Baptiste
Lamouroux

THE
National Geographic Magazine

Vol. VIII

DECEMBER, 1877

No. 12

THE WASHINGTON AQUEDUCT AND CABIN JOHN BRIDGE*

By D. D. GAILLARD,

Captain, Corps of Engineers, U. S. Army

The idea of supplying the city of Washington with water at some day was contemporaneous with the planning of the city, and numerous examinations and surveys were made by Major L. F. Balfour, the engineer and architect of the Government, under the direction of General Washington, of the Potowmack river, the Eastern branch, Rock creek, and numerous springs and small streams, as possible sources of future supply.

The first definite plan to be found among the records of the Washington Aqueduct Office is given in a report made in January, 1831, by Brevet Lieut. Col. George W. Hughes, Corps of Topographical Engineers, to Colonel J. J. Abert, Chief of Topographical Engineers, in compliance with an act of Congress, approved September 30, 1830, appropriating \$500 "to enable the War Department to make such examinations and surveys as may be necessary to determine the best and most available mode of supplying the city of Washington with pure water and to prepare a plan and estimate of the probable cost of the same, to be reported to Congress at its next session."

After an investigation of the subject Colonel Hughes proposed to obtain the necessary supply from Rock creek by damming the stream about six miles above the city and bringing the water into a receiving reservoir through a conduit of oval cross-section having an estimated capacity of 8,000,000 gallons in 24 hours.

* Read before the National Geographic Society, October 12, 1877.

It is interesting at this point to compare the estimate of the supply needed for the city in 1851 with that actually furnished in 1897—but 46 years later. The population of Washington and Georgetown was then about 45,000; now it is over 278,000; then 30 gallons was considered by Colonel Hughes a high estimate for the average daily per capita consumption; during the past month the average daily consumption for every inhabitant of the District of Columbia was 173 gallons; then the total estimated maximum consumption of water was 1,350,000 gallons per day; during the past month it actually exceeded 4,000,000 gallons per day.

No action appears to have been taken by Congress toward carrying out the plan proposed by Colonel Hughes, and the next step was one which eventually resulted in the construction of the present aqueduct system. The 32d Congress at its first session appropriated \$5,000 to enable the President of the United States to cause to be made the necessary surveys, projects, and estimates for determining the best manner "of affording to the cities of Washington and Georgetown an enabling and abundant supply of good and wholesome water." In accordance with this legislation the necessary surveys were made in the winter of 1852-53 by Lieutenant (afterward General) Montgomery C. Meigs, U. S. Corps of Engineers, who, in his report of February 12, 1853, proposed three plans for obtaining the necessary water supply, exhibited estimates of the cost of each, and entered into a broad and far-sighted discussion of the subject of supplying the cities with water.

In urging the necessity of a suitable supply he states that it was the general custom in Washington at that time to have all "the water for a family brought by the servant-maids from the street pump," a crude condition of affairs which the average Washingtonian of today will find it hard to believe existed but a little more than 40 years ago.

Briefly summed up, the three sources of supply proposed by General Meigs were as follows: (1) From Rock Creek, by means of a dam and a conduit under natural flow. Estimated minimum daily supply, 9,800,000 gallons; estimated cost, \$1,258,963. (2) From the Potomac at Little Falls, six miles above Georgetown, by means of a dam across the river, a canal and pumping machinery to raise the water to the reservoirs. Estimated minimum daily supply, 12,000,000 gallons; estimated cost, \$1,662,215. (3) From the Potomac, just above the Great Falls, by means of

a ditch, a reservoir conduit, two reservoirs, and the necessary bridges. Estimated daily supply, 36,000,000 gallons; estimated cost, \$1,921,244.

This last estimate was based upon a conduit of seven feet in diameter and a bridge of a different design from that finally built over Cabin John creek. General Meigs recommended an increase in the diameter of the conduit to nine feet, which, with the changed plan of the bridge just mentioned, made the final estimated cost about \$2,425,000 and increased the estimated capacity of the conduit to 67,500,000 gallons, a most fortunate change for the citizens of the District of Columbia, for, had the seven-foot conduit been built, the limit of its capacity would have been reached about six years ago.

In his report General Meigs urged the adoption of the third plan, calling attention to the fact that the waterworks of this country had been almost invariably designed on an inadequate scale, and that the history of all these works showed that the daily per capita consumption of water was increasing at a rate comparatively rapid. In consequence of this fact and of the rapid growth of population, many of these earlier works proved insufficient within a few years after construction.

Too much praise, then, cannot be given to the man who in 1853 planned a conduit with an ultimate daily capacity equal to one and one-half times the amount then furnished to the city of London, nearly four times that furnished to Paris, two and one-half times that furnished to New York, five times that furnished to Philadelphia, and one and one-half times that then furnished to Rome, although in A. D. 101 Rome had a daily supply of 377,000,000 gallons. Be it remembered that General Meigs did this when the combined population of Washington and Georgetown was but 68,000, which it was estimated would then require for all public and domestic purposes a total supply of but 5,220,000 gallons, about one-fifth of the ultimate capacity of the conduit.

General Meigs' recommendation of the enlarged Great Falls plan and his reasons therefor carried such weight that they received the strong endorsement of General Joseph G. Totten, Chief of Engineers, when he forwarded the report to the Hon. C. M. Conrad, Secretary of War, who submitted it to President Fillmore without comment.

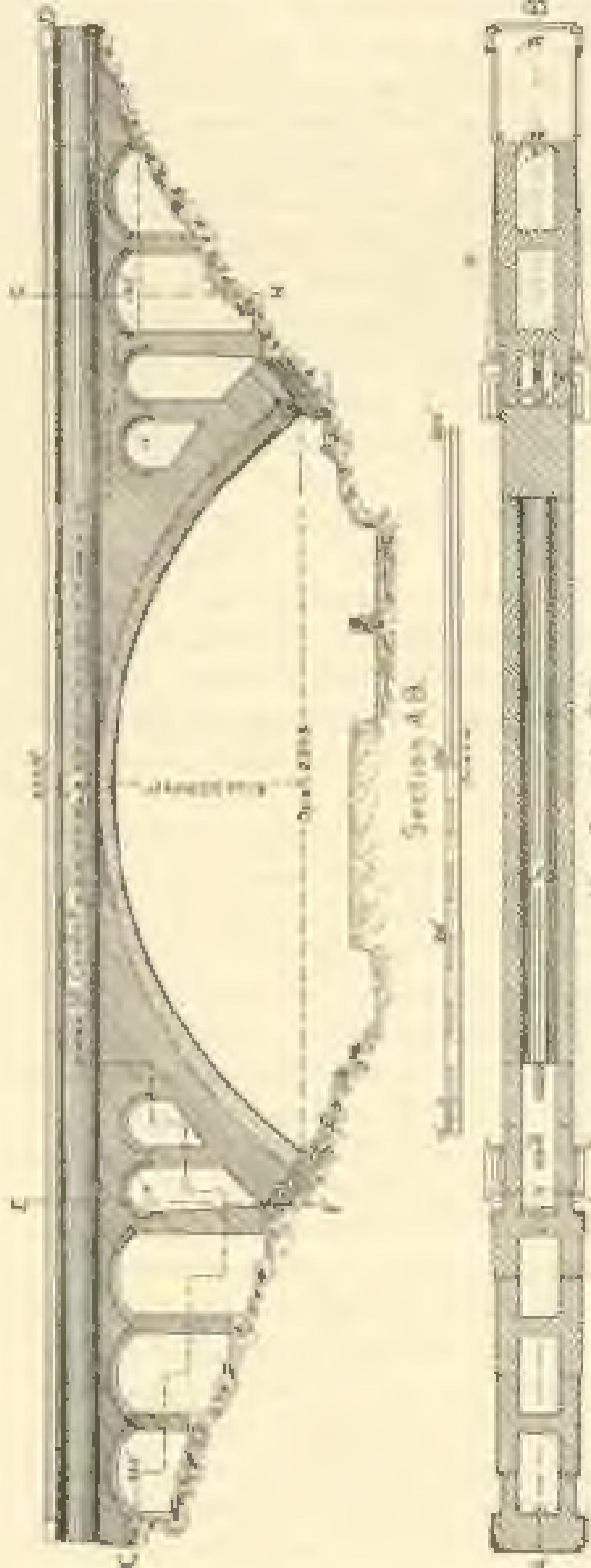
The first appropriation for the construction of the aqueduct was made in March, 1853, and the actual work of breaking ground

was commenced in November, 1853. In order that the city might receive a supply of water as soon as possible, work was pushed upon the receiving (Dalecarlia) reservoir and the conduit connecting it with the supply mains, and on January 3, 1854, water from the Dalecarlia reservoir was introduced into the pipes leading to the city. This was not Potomac water, however, but was supplied by the streams emptying into the Dalecarlia reservoir, which streams are now diverted therefrom by the admirable system of protection works completed in 1855 by Colonel George B. Elliot, U. S. Corps of Engineers, retired. This mode of supply continued until the conduit between Great Falls and the Dalecarlia reservoir was completed, in 1863, and on December 5, 1863, Potomac water was introduced into the Dalecarlia reservoir for the first time.

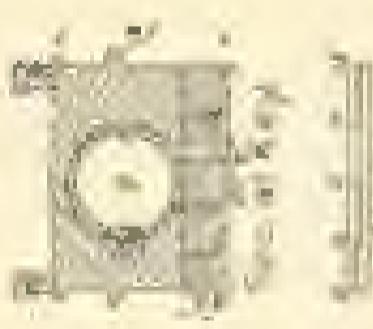
Concord Island separates the Potomac at Great Falls into two parts, known as the Maryland and Virginia channels respectively. In order to divert water into the mouth of the conduit feeder at Great Falls a temporary dam of stone and crib work was built across the Maryland channel, 1857 to 1864, which was replaced by a masonry dam completed in 1867. In 1863-68 the masonry dam was extended across the Virginia channel. In times of very low water in the Potomac this dam, the crest of which was at an elevation of 148 feet above mean tide at the Washington navy yard, did not raise the water to a height sufficient to fill the mouth of the conduit at Great Falls, and in 1866-78 the whole dam was raised 24 feet, so that at low stages of the Potomac the mouth of the conduit is just filled.

The Washington conduit system as it exists today is, with but few modifications, that originally planned by General Meigs. The water supply is taken from the Potomac river at Great Falls, about 14 miles above the city. At this point a masonry dam eight feet in width on the top and 2,577 feet in length, completed in 1868, extends across the river from the Maryland to the Virginia shore. The water passes from the feeder, under the Chesapeake and Ohio canal, through the gatehouse and into the conduit, which is circular in cross-section, and for the greater part of its entire length is nine feet in diameter and composed either of rubble masonry plastered or of three rings of brick, but where the soil in which it was built was considered particularly good the inner ring of brick was omitted and the diameter was nine feet nine inches. Where the conduit passes as an unlined tunnel through rock the excavation was sufficient to contain an unlined circle 11 feet in diameter.

САНИТЭРДАЧНН ӨНӨГӨК



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ACQUAULT BRIDGE OVER CAMPBELL RIVER, NEAR WASHINGTON, D. C.

The total length of the conduit and the two by-conduit around the reservoirs is 12 miles, and its slope is nine inches in 5,000 feet. Constructed by General Meigs in cooperation with the aqueduct system are five bridges, two of which are unique among engineering structures and will be briefly described later.

At the distributing reservoir the water passes into four cast-iron mains—18 inches, 38 inches, 50 inches, and 12 inches in diameter respectively. The Dalecarlia reservoir has a storage capacity of about 150,000,000 gallons, is practically without paved slope walls, and is perfectly protected against pollution from the drainage of the surrounding country. The distributing reservoir has a storage capacity of about 100,850,000 gallons and is divided by a padded and paved wall (through which is a passageway) into two sections containing 87,000,000 and 53,250,000 gallons respectively. The Georgetown high-service reservoir has a capacity of about 1,500,000 gallons.

In addition to the three reservoirs already mentioned, which form a part of the aqueduct system, there is another reservoir, built and controlled by the Commissioners of the District of Columbia, called the Fort Reno reservoir, with a capacity of about 4,500,000 gallons, the reference of its water surface when the reservoir is full being about 120 feet above mean tide at the navy yard.

The Dalecarlia and distributing reservoirs supply the pumping station and that part of the District which lies below 100 feet above datum. The areas lying between the levels of 100 and 210 feet above datum are supplied by pumping from the U-street station directly into the distributing mains, the Georgetown high-service reservoir being held as a reserve supply. The areas having a greater elevation than 210 feet above datum are supplied from the Fort Reno reservoir. It will be observed, therefore, that the total present storage capacity of all reservoirs is a little less than 307,350,000 gallons, or about six days' supply.

In July, 1857, for the first time in its history the conduit was permitted to discharge its maximum flow, which by current meter observations was found to be 70,560,000 gallons per 24 hours. Today the average daily consumption is about 45,000,000 gallons, or about 60 per cent of the ultimate capacity of the conduit. Ten years ago it was but 35 per cent, or less than 27,000,000 gallons.

To avoid misapprehension it should be stated that while the conduit can supply the distributing reservoir with 70,560,000 gallons per day, yet the pipes leading from the reservoir to the

supplies, and no time will be felt by contractors to be bound

from the distributing reservoirs to the city.

General Meigs was in charge of the work upon the Washington aqueduct from the time of the first survey until July 1863, when he was succeeded by Captain H. W. Burleigh, of the U. S. Corps of Engineers, who until then was succeeded by Lieutenant James M. M. of the same corps. On February 22, 1861, after an ad-

advice of the War, Legion aqueduct was transferred from last

April 1861, when it again passed into the care of the War Department, and has remained to the present time.

In his report upon the proposed line of the aqueduct, General Meigs said that seven miles after leaving Great Falls the only stream available is a wholly erratic, the valley of Custer John being dry and exhausted. This valley, he said, is fit to be crossed

long ago "they always encounter a long of head or else exceed it and the bridge they replace." He therefore first proposed to cross it in a dry ravine 452 feet long and 20 feet wide, with

height 50 feet. The estimated cost of this bridge was \$7,449

against a bridge, the proposed stone arch 110 feet long, was estimated.

The total length of the bridge, including abutments, is 400 feet. Its width is 20 feet 4 inches, and its height above the bottom of the ravine 12 feet. The span of the arch is 92 feet and the rise 50 1/2 feet. It was built in 1857 and completed, when the river, by a of the parapet walls, in 1858. These walls were built

bridge prior to that time by labor grants. At the original

cut on south of stone dam, dry, composed, and rock, and it

THE DESTRUCTION OF MARY

Montgomery county, the bridge across the Susquehanna river, and the roads and supplies, and put out of service as follows:

Contrary to the general impression, the bridge between the suspended and abutment walls is not bad. It has sustained several violence of the wind, but is still in the drawings, for effect of saving the machinery. Materials were transported to the bridge by boat on the Susquehanna and the canal and Calhoun creek, across which a dam was built near the end of the canal, a dam so formed was connected with the latter by a lock.

The dam is now out of the canal, but most of the bridge has been washed away.

Washington's Appointed

George A. D. Dix, President of the U. S.

War and Navy, Secretary of War

+ April 29 A. D. 1861

President of the U. S., Andrew Johnson

Secretary of War, Salmon P. Chase

This bridge is a part of the line of defense of Harrisburg, which was put out of use in October of 1862 by the commanding general of the Department of the Interior, Hon. Caleb B. Smith, as the bridge department of the canal had been recently transferred. It is within the scope of the facts historical that when it was Secretary of War at the time was created and organized by the Senate, the first of the four, it was not so named, for the element of defense or protection to the country to the extent of the river, a impression upon the territory of the visitor that would have been the case had it been so named.

On examining the description of the Washington's Appointed in the papers of strumous, it is my opinion, attention to whether of the bridges, to be the best work on the river, on the river, the water for its location, origin by no means a bridge for the general government.

It is 3000 feet long, crossing the Susquehanna bridge of the world, so that it is made in a manner through which the water flows about one-half of the water over, being thereby themselves some 1500 feet long which support the roadway, so far. The span of this bridge is 200 feet and is also 20 feet. At the time it was built it was the only one of its kind in the world. It has, however, lost a great deal, to its condition at the present day. It was much improved upon by hydraulic engineers, as I was illustrated in many of the original publications and drawings, in time of the



CAROLINE GREENE IN PAPER

He will be present to read and report that the report of the Committee of Mr. Committee on Holders, which occurred at the end of my

The first Committee out of the Progressive Society was appointed to look into the new if it should be called by that name. In this the new Institution did not do a bad job. The Committee, University professors and people from all walks of life, and off the educational jargon, had however a publication of the best of it, and a liberal budget of a thousand dollars, to a sum of money, which the National Congress had given to the work took the task in hand and did a creditable job. The President of the Society from its foundation, Mr. L. M. Clegg, was enabled by a variety of circumstances to accomplish his task with credit to himself and a record that is probably without a parallel. In the history of recent legislation there has been nothing like it in the contributions of

The White Committee is a heterogeneous and jaded collection of dry bones, for we are a mixture of types of the most contemptuous and backward progressive elements. None of us ever before however, have there quite equalled some bone dry old jugs.

last fall when the W. & G. got to Mr. Hubbard and was his opportunity to state his case about the "The West to the Nation" (see page 10 of this issue) and his desire to have the correspondence made public, many expressions of support were in sight and the report was well received.

It is impossible, in the short space of this Magazine, to give a full account of Mr. Hickman's unique personality, or to do justice to the nobility of his character or record. In addition, it is to be regretted that the Society has not been able to make a complete arrangement to the satisfaction of the author. However, the present issue

far from any - a host of schemes, and no more than a few to be
put into practice of his ¹ to and work will appear in the January
number of this journal. J. H.

POLLUTION OF THE POTOMAC RIVER.

BY F. J. SWAN.

Chief Engineer, U. S. Geological Survey.

The facts concerning the pollution of the Potomac river are of particular concern to the residents of Washington, because of the fact that the supply for domestic use is to be taken directly from that stream only a small portion being ob-

scured but of course differing widely as to whether those pollutions are due to be or may be sources of over-pressure, either to the community.

In order to discuss this subject intelligently it is necessary to have clearly in mind the situation of the catchment basin of the river, as well as the relative position of the various tributaries and of the principal towns and localities. Washington is

midway of the eastern side of the United States. It lies in the Alleghany mountain, its drainage basin covering portions of the states of Pennsylvania, Maryland, West Virginia, and Virginia.

Washington stands high in one of the rivers flowing either northward or southward, the former flowing toward the Atlantic, the latter flowing toward the Gulf of Mexico. The river flowing toward the Atlantic is the Potomac, the principal tributary of which is the Susquehanna, which flows through the state of Pennsylvania. The river flowing toward the Gulf of Mexico is the Ohio, which flows through the states of Ohio, West Virginia, Kentucky, Tennessee, and Mississippi. The Ohio is the largest river in the United States, having a drainage basin of about 150,000 square miles.

As a source of power it will not be likely to be exploited from the size of its drainage basin. At the point where the river

estimated that which it comprises for a line state boundary between Maryland and Virginia, and which is about 100 miles long.

or than the other state. At the junction of the two streams the

other, the North Branch, begins to the west of the Alley and extends from the south branch to the west. The total drainage area of the North branch at Cumberland is 300 square miles, or about 8 per cent of the entire area lying above the city of Washington. The total drainage area of the North branch at the mouth of the creek, i.e. at the South Branch, is 1,000 square miles, being a trifle smaller than the area drained by the latter.

The waters of the North, both of which it contains, except for its head, are naturally somewhat dark in color, and it is stated by the old inhabitants of the region that it has always been this way probably to the presence of decaying vegetation under such an exposure. This is further manifested by the numerous floating swampmills, bottoms, and marshes, so that at the old landing near Keyser the polluted water emitted by the fall and sandbank is swept up in the early morning in a layer of refuse 10 feet thick.

In order to obtain a general impression of the amount of pollution it is necessary to know how much water is received by the river. This, of course, varies from day to day and even hour by hour. To ascertain the fluctuations are slight and by taking special surveys it would not be possible to know how much water is delivered by the first stream and the principal tributaries. Without entering into a discussion of how this is possible, it is not difficult to estimate the rates given in a table showing the average daily flow throughout the year in the feet per second.

The average annual flow of the river has been computed by the U.S. Army Corps of Engineers, Mr. W. H. Hunt, in 1870, to be 1,000,000,000 cubic feet per second. It is probable that, during the past half (1880), owing to the protracted dry weather, the discharge was to about this amount. At that time the water received into the river was stated to have been from 75 to 100 million feet, or from 7 to 8 per cent of the total volume of the river.

It is evident that the quantity of water in the Potomac especially in winter, decreased to a point, following the rainfall, when the water necessarily became less so. The quality of the air or

is therefore becoming more and more a matter of anxiety be-

The natural flow of the stream is practically unaffected. As before stated, the important part of two kilometers is unaltered and,

to least part the residual water lost by evaporation of 1000 liters. It exists as a slow current at which the water is 90° pure (not made, washed) and may remain in suspension for days, even after the water has been passed through three filters.

The proportion of fine mud varies from time to time, the greater during floods and least during periods of low water when the supply is received by percolation from a large area.

Unstable as this anerobic development is concerned but the flow is never greatly impeded and the proportion of sewage must be clearly measured.

When the bacteria in the sewage are in a state of great activity they pass through the filter and are removed. The residual trampers, on the other hand, are not so easily treated. The finer particles of the waste from the filter and even during extended aeration are carried down the stream allowing them gradually to pass through the filter. This is a condition which discolored the water, a condition of the water and in giving a bright, sparkling effect to that waste due to sewage when exposed to light for a few hours may be understood.

INSTANCES OF TRAMP OR TRAIL OF SEWAGE.

The pollution of the West Branch water supply would be very difficult to be known except the stream cuts the outfall just below Cane Island and when the water is very bad at low water, it should be remembered that it is there a non-polluted stream where the non-polluted discharge of Fort of Dixie, an area to be served, is also a salt-seawater and the Monmouth River is under

control of the waterworks at Cane Island.

In 1890 of West water, when, of on 1890, passed the Hudson River the largest part of the total supply the Potowomut was one and

probably contributed not less than 20 per cent of the water

at 100 miles of broad river that agitated and broken

the oxygen and carbonic acid leading to the putrefaction. While I could not assess contribute to this rate the quantity of the water,
it is contended that the supply for the city is entirely as it should be.

Nothing has been said to put out of consideration the amount of filth of a kind to be daily disposed of into the river, and that has to steadily increase. It is not desirable to ascertain or characterize this material under any other term than sewage.

It may properly be claimed, however, that the matter has not been treated as it has been charged, it has not been destroyed before it is sent out into the river, and that the Washington dredged it. The set parallelism of these things will

not show the truth, but it may do much for the elucidation of much of the present article.

The conditions being the following are particularly favorable, for the water passes over many hard riffles where it is exposed to the air, carried up, while others may possibly be dredged down.

The chemicals used to treat the water, that is to say oil of Javelin (or generally diluted), and by reaction upon each other and upon a small amount of bacteria, a solution probably from ferric oxide is produced. The movement of water therefore is an important part of the small micro-organisms to which the transform

Take, for example, the fish of the river, which is said to be from several ways of more and to develop in length of 10 to 12 inches in 24 hours. It may be the source of from two to four days or more for the sewage of towns up the river to the mouth of the aqueduct.

We are comforted by the assurance that bacteria, in large numbers, are found in Potomac water; but still this does not set us wholly at rest for negative evidence is such a case precious little. The transmission of the subacute disease from sewage

experts in other lines, for our work in hand portends mainly

The facts which have been just mentioned are those concerning the surface and quantity of water in the river. The following and

it will be seen that the water is dictated by the amount of flow of the stream.

Local state or national legislation can be enacted to regulate such matters, the better we are in the case of all our state areas or coast areas as a sort of sewer into which towns and manu-

facturing establishments empty their refuse, and this fact must be borne in mind in all consideration of water supply. The pi-
potable water supplies from this source should begin at
the wells—that is to say, pollution should be prevented as far
as possible. The water supply for a city should be treated.
The state of Massachusetts has set the exact law in this respect,
requiring it is the duty of a city to annually force the town
to provide an additional sewer for sewage but to allow it to
discharge into rivers and a body of water and then attend
filtration for the water which is to be used for public pur-
poses. The system of, let it be said, sufficient has been found
to be efficient as well as to take out valuable parts as well as
potentially harmful parts of the sewage.

THE DELTA OF THE MISSISSIPPI RIVER.*

W. B. T. COMPTON, C. E., etc., etc.

The Mississippi delta proper is a series of islands bounded by the mouth of the river above the city of New Orleans. The islands comprising this great mass of sedimentary deposit have been partly delved out by numerous artificial works which have from time to time been driven for the purpose of obtaining as much as possible water. There is, doubtless, no such place as the island

the land was broken and the work ended, but the ground was pumped out at the last foot.

* Assignment of paper and book.

15. The British Assoc.

Many interesting facts bearing upon the growth of the gaging and formation of the Mississippi delta were brought to attention by the great survey which investigated and delineated the

excellencies of the little delta. It has been the War Department's care to secure in the original plans of protection for maintaining the depth and width of channel which Mr. Eaton has recommended by the law of the general Congress to maintain between the deep water of the South Pass of the Mississippi river and the Gulf of

the latter lay out what bears out to the following of the now improved passes of the river and branch of Mississippi magazine.

On the 10th of the South Pass this magazine was in a fair state of preservation. The exterior was intact and there were no cracks

or holes, but a small portion of the plaster covering around the arched walls of the outer corridor, the end of which must have been a least 10 feet below water. That was in the year 1853. Sixteen years later a part of this structure had been removed and the arch of the roof was taken out to show that the plaster which had covered it was as firm as during the preceding two intervening years. It may be stated that that, but from this instance and from other testimony, is at the mouth of the Mississippi about one-half of one-third of a foot per annum. No more an illustration can prove the greater subsidence of the delta than might be stated. Not only are these banks liable to a continual subsidence, but they are often found to be so in different directions. It is an instance of interesting as well as physical fact that an acre of land a few rods below the ordinary

to be 717 feet in length. It has been found impracticable to maintain with sufficient accuracy for revenue purposes the gauge marks level heights, as 1.0, 1.5, 2.0, gauges. This subject is fully discussed in the 3d part of the Mississippi river report, by

Professor J. G. White, "Discussions by Length marks and Box,

"
"This available." This remark is made by Mr. J. A. O'Leary, assistant engineer to the corps of engineers.

He began well to report the current as on the 1st con-
cerning Mr. Clarkson's statement by its own account, as follows:

"The mouth of the river had to be given some information
concerning the sand and gravel on of the sand bar at the
mouth of the river. In the report of Assistant Engineer Clark-
son, up to and to the report of the surveyor a number of figures
and our parties are given, based upon this survey and prior
ones, and exhibiting progressive depression of the sand bar at the
mouth of the river." An interesting diagram, designed to

show how down on the level of the bar had gone up over one

forward to show, in addition to the above, that the banks I
have to the right the flood level and not changed. It is a
fact well known to you, to many in the basin of the Mississippi,
of overflow by flood waters, except the cutting of the sides

in the construction of levees. There are at present no removals
of the river. These accretions formerly were a little more im-
perial to the annual sediment of the river.

As to the question of the cutting of the bar level, you
will note that in the report of the Assistant Engineer Clark-
son it is mentioned that the bar is cut down to the level of the river
and the sand bar is steadily from year to year and from year to year the
water is not naturally expect that, with the exception of annual
depressions to which is due to the surface of the river

and the sand bar is steadily at the same level. The difference in
water height as compared with the greatest amount for a part make
and maintain the bar level. From year to year water levels
may be shifted and the river is precipitated on, river I imagine, in
a very small amount of time, but it is a very great difference in
probably. This is, this is a very important consideration whenever

the question of which a according to an opinion, by from the statement

of the bar level.

There is a report for a 4th additional. According to the report and statement of Mr. Clark-
son, the bar level is 10 feet above the river level.

THE ANARCHIST FEDERATION

The profile of the right of the Meuse is to an extent the profile of the delta of the river, consisting of sandy bars, and the steady, though slow, subsidence of the banks, is one of the causes to be taken into account in the

water currently seep into the great areas of the lower delta country, for without it the basin tendencies to future subsidence from the subsidence of the coastal delta lands below the level of the sea, would

valley, yet it is safe to say that the movement of the delta

But it, at which point in the narrative should the Federal
forces meet, will be so much the less of the who is
to tell it, for the next afternoon, when the time comes, to build a
fascine bridge across the Grand River, as the city of New Or-
leans now hangs on a single skeleton of the old system of rail-
way communication. It had done for centuries a work now
about to be superseded. In my first visit to the river I was
thoroughly involved in the great project of the destruction of the bridge maintained by the Zouave Zou. He had a project, a plan, but

THE ANNEXATION OF EGYPT

Section 8.1 | The Meaning of the Survival Function

Med, greater or less elevation

In the olden time, when the earth was peopled by savages, the negroes of territory by conquest invaded not all the

in cold heart. In whatever way it was done the conceptional supremacy will make a source of profit to the victorious party.

There remains simply a range of jurisdiction. The laws and the flag of one state are substituted for those of another. There is no change in the territory or in its laws, and in this consists

the effect of it, I think, beyond all question. The nation is not affected by the new condition. It may or it may not be strong enough, according to the character of the organization.

But while the results of any existing territory I see thus becoming nationally changed, the day the subject for its acquisition has

arrived gets its extension. In other words, the greater part of the world is put into a new purely political condition, such instant. Having regard to the rules of property.

Two questions whether acquisitions of territory are desirable or undesirable arise here: if the proposed acquisition, its situation and

THE END

The Lincoln speech, of which I should go very slowly in this matter, but because it stands at the head of the volume, is published elsewhere almost as a tribute of homage to its author.

Viewed critically, the annexation of territory up to a line just
short of our statement. We needed Alaska to defend the
Alaska, removed Spanish power from our border, and gave us
the entire Atlantic and the Pacific, the outlet of Texas and
up our area of jurisdiction into contiguous form. But why we
should have released Alaska is not fitting out. A few of
our citizens have profited by the fur and fish trade, but the govern-
ment has lost enormous and yet to be compensated in the
area profit in the future.

made up of our own kin, the vast body of the population is
a distinct addition to our numbers. The population of Alaska

the other power is equal to our freely in time of peace. In time
of war our power will be a great deal more at home without
wandering away from the home base is on our side. We
power especially a naval power. It is certain that in case of
war with such a power as ours first of all would be to give up
all such outside dependencies, and our defense would be
utterly impossible.

This is not certain, however, to the Hawaii, and, in this
I do not think the following case is clearer than the latter

have passed this stage of argument.

What has been written of Hawaii applies with much greater

and we keep in mind that the White Party (as we afford to call our national party) is in a minority of more than 50 per cent? Can we afford to have no responsibility for a policy of such a large government as the C. P. calls for? Can we afford to put up?

As in the United States, a proposal exists that the administration to
call off such negotiations, but it is impossible to say what
any body, for, assuming for the moment that the interests of the
United States to be under the control of such a body, would
not this be seen would be very greatly increased by such an act.

There is a gradually more or less bulk about the elements of a legend. There is no objection to this at all in case of any

electra of Crete I visited their North. And as we sail back to the
Isthmus we do the west that is to the westward where I have a range
of one poor place and a town over a part of which at least, is of value
in the right way (and beyond).

having passed at the Senate on 1st February of proposed an-
+ up voice and gloom at the history of other nations and the mis-
ter and the peoples of their ages. (1) will the 1st the Central Bank in
the whole the greatest general for India. Her judgment on to de-
w. o. n. t. e. earth. The last a month in western Europe governs
many things of a great order, including Canada, A. m. India,

Whether the ends of all Government, good government and safety to persons and property are realized. To enforce just laws, to protect all the citizens who live in the country to support

of a little training; and yet, in spite of her large starting army and her trained army, she is one of the weakest of her race, because her responsibilities have been increased in still greater proportion.

What kind of a government by any party of people in the territory? Is

are now scattered over less than half the land of persons of our descent. And yet more of her people have gone to the United States than to her own.

She has lost, on the whole, one of the greatest orators for good, by the spread of a virulent sickness, but the world has known

SIR JOHN EVANS AND PROF. W. J. MORSE

Whether one of the ultimate results of that long but troublous

year in which constabulary striking a characteristic of the year next will be to render it impossible for a man to labour prominently in more than one department of his country's history

Let us for the advancement of science have the very best

in those kind and other departments of science

In development of civil engineering and paper manufacture and highly successful in both enterprises, Sir John Evans has made

trials by the names of Horace and Jowett, of Lrell and Mawr, of Hoxey and Tyrell, he has only the more creditable contribution to look forward to—the presidency of the Royal Society.

In my judgment, one of his eminent English countrymen, Prof. W. J. Morse, of the University of Michigan, is

wonderful, and, in my judgment, the most important, a decided fa-

University of the State of New York. He established the and other agencies throughout southeastern United States, to of over 100,000 square miles. In his later work as Hydrologist in charge of the Bureau of American Ethnology he has made the aboriginal rivers of the North American continent, and his reports and his numerous exhibits in the transactions of outside societies. No worthier representative of American science could have been found to preside over the American Association during the year of the visit of the British Association to this continent than Prof. W. J. McGee. J. J.

SOME RECENT GEOGRAPHIC EVENTS

considerable geographical interest have on my hand a report to go

a brief notice of them, if only as a reminder of record.

One of the seven Helen from Central Asia. The successful ascent of Mount Elbrus by Prince Luit of Savoy, and the Museum Ex-

hibition of Professor Hugo Mollwo.

Messrs. A. Andree, accompanied by Dr. Strandberg and the en-

trepreneur of the expedition, as well as the recently es-

express, that Herr Andrew is an elderly man at least, have not
lost his in his skin courage, and confidence. Dr Nils Ekblad, the
a

Admiral from Stockholm, comes to pay a visit to the King and Prince
Friedrich; that he would endeavor to make his way to the
Russian depot that has been established in Livonia and that



no surprise would meet in the event of his communication being
received from him until next spring or fall. Mr Propp has
nothing to say. He
is still willing to prevent Andrew, with good work, from departing
without giving him to say where he is likely to be.

been taken. Then followed, I go first to the coast of Greenland and year will be devoted to Victoria Land. The weather is well and a summer day to

go on, will I left England on July 11, 1891, in the steam-yacht *Endurance*, arrived in the Thames on the 3d of September last

and started the northern coast of Franklin's Land, hitherto absolutely unknown, but found if not the exact position of the coast but at least the fact that it does not lie in the angle to that has been assigned it. The three years spent in the North

which was directed by Mr. A. C. Barbrower who has since placed the *Endurance* at the service of the Polar Peary) have paid just

another geography but to various other subjects.

Professor Peary's most recent expedition to Greenland is of the character of account of the same which has advanced his ability to bring back with him the Cape York interior, for he

most difficult and difficult leaves the north for so far as to its unexplored parts.

The return of Dr. Sverdrup from his four years exploration

of the North of Spitsbergen in October, 1890, returning to Norway, he had been on May 11 last. He made many important discoveries among which were two great ones, one toward the south, whose point ages and says that our witness to a high de-

and Norway and a few private in the north.

The Duke of the Almoozzi (Prince Laius of Norway) and his com-

on July 31. It took 38 days of hard traveling to reach the foot of the mountain from the point of embarkation, but the arduous

put out, while extensive July statistics was made under most favorable

circumstances. Looking forward to the last week of

October only a few reached the summit, and the inevitable death

night of July 27-28, cast a gloom over the entire subsequent

process. Professor M. C. Lee, who occupied the chair of

chemistry in the Oregon State University, was an experienced

trekkeler ranger. A valuable article from his pen on the A. t. t. of

Mount Adams, Washington, appeared in the *Adv.*, 1891,

Vol. 1, No. 1, of this magazine.

GEOGRAPHIC LITERATURE

The Anatomy of Geology. By Sir Archibald Geikie. Pp. x + 297. London and New York. Macmillan and Co. 1897. £2.00.

"How shortly of the earth's past in the New World trusted of the

old largely scattered and quickened by the movement of the Americas, and

by combinations from the scant evidence presented on that vast north

oceanic opposite side and their work. In the following a consider-

able number of features," the last the promise of one problem to fulfill,

but with the sufficient reference to the western Indies here.

It is singular that retaining a geological as next to the youngest name of the

author, no subsequent student has sought further to trace the trend of

the group he has left. Indeed, though some notes on this done long ago are

now scattered, no attempt has been made of it again. The author of these

notes, however, has done much to credit to every fisher of the task in

hand, and the author of the present article has done the same.

He is, however, compelled to do so, and the author of the present article

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in bringing out clearly the important contributions to cartography made by one whose name has so long been heard in this genera con Jesus.

The earliest known geographical tract, one of the first to describe the approaches to the Far East, is

to be attributed to a geographer of distinction, of whom, first member of the Chinese court of the T'ang emperors, creation of capital, Peking, tracing them to Wu-wei and so if you find his interpreter, Iambrey, who in his *Capital* ("the city of the east"), in general, to put the chief duty to the Chinese, Thorough, von Hart, Buckland, C. von Harten, and a Latin,

and a name of less known makers of the volume, his treatment being less than sufficient for geographical. It remains of his own a full application of modern geographical—the New Geographical American could easily find the work, but it was first made by reason of the character of such names as those of our own. In it, the principal author of the *New York Gazette*, of England the prop of of our own bodies and of those, the successor of the learned and the founder of the

last named, while its authorship is made better by a full name,

Japan, the Kingdom of the East. By Elias Hollmann Schmidtmann, Author of *Twenty-six Days in Japan*. Pp. 250, with illustrations. New York: The Century Company. 1881. \$1.00.

Four hours reading are sufficient to make every library have this. It is a full page of an article, dealing with the year has been—obtuse in topography and major, artistic in illustration, and still more obtuse than others but the publishers' great fortune in library keep and interest, and the book is no less interesting to the artistic. To want the art of the artist's industry the spirit of enjoyment makes for a long sleep of the dark ages, and that there are good illustrations I cannot say, but of the pictures of great fortitude in library keep and interest, and the book is no less interesting to the artistic.

But suppose the less heralded name of the author, on the author's check—himself have not been followed with equal attention—the book by long a masterpiece per se. So far as the book was not composed enough, the state of a government in general as a sort of contribution toward the world wealth of Amsterdam and Rotterdam rendered the us, to sell it here, to The Hague, where Java was at once again to be turned in the other plantation of the Dutch East India Company. True, there is a rich collection of the Dutch, antique and modern, in

the *Geographic Library* of the *University of Leiden*, yet to the mass of material, people's interest is soon outshone by a desire to

Geographical literature. The author spent months in the country, and made numerous excursions, but he describes the results, consisting of 600, often graphic, not poor pictures, and can justly be said to be the most interesting of all geographical books and strongest in its

atmosphere. At times, however, I could not get a copy of any, I suppose, devoted a lifetime to a book (with permission from the author's publisher), which was often a heavy blow to the author, of whom, it is thought, the old were compelled to wait, but so promptly from the book

America—going over the books. In this article Miss Estlin has written and tells over the grand banner, while the light of the sun by my side, I call out stations out between the lines—such that are in a group, and too widely separated for details. The first chapter is "Hunger, pride, and avarice," the second "To 'Java Major,'" the third

"Under a Cloud of the Forest," next "The New jungle," then "To the River," the sixth "A Dutch Santa Lucia," the seventh "In a Tropical Land," the eighth and ninth "The 'Coca-leaf System,'" the tenth "To Bogotá," "The Amazon's 'Thief of Life,'" the tenth "Arrive the Youngest supporters," the eleventh "To 'Java Major,'" then "Principles of State as Army Doctor," followed by "To the Orient" and "From Doctor and Merchant." The seventeenth is "From 'Human' to 'Highness'" and the "Cape of the Scandal," next is "The Land of Sun and Savagery," then comes "Bogotá" followed by "Potosí & Co. The 'Airs of a Polymer'" the twenty-second is "'Tj. Atjap," "Cochabamba," "Chachapoyas," then follows "Cortez and Potosí," and lastly have a number of appendices, full up "Cochabamba," the

captions, mostly contained in the chapter, suffice it to all apparently

absolutely, the coffee planter has no desire and, and the principal of coffee is not only unachieved, but the planter does not get up and too great verbal load exists in any article—such indication that would a volcano which is reported to exist to the near of Java, between the Potosí and Bogotá.

The book is highly profane by its author, and may be untrustworthy of authentication, although the many copies of the

Our Best Educational Literature. By George W. Redway, F. R. S., F. G. S., with nine and a half maps. New York: Chapman, Chicago: American Book Company, 1896. 400 pp. 12s.

For many years ago we were told that geographical text books were most satisfactory, and that the value of geography was in common opinion equal to, but not far greater than that of

Geography as it has been heretofore taught in the schools, as a science. It is not more than a mere cause of uncorrected facts relating to the earth's surface. Geology and Topography are not beginning to understand the geography of the world around us, so that the phenomena of the earth present such facts as effect, and that geography is the only still admissible basis for the humanistic school geography of the future.

The best of existing works of geography, by the study of the value of the earth, give a decided advantage in geography teaching. The "Geography of Ten" prepared by the New York Educational Association in 1892, in its effort to help the study of geography, is a step in the right direction, but at the same time it limited the scope of geography to a study of the surface features of the earth. Later, the "Geography of F. R. Stebbins" is a great step in advance, given to the entire scope of geography in its full humanistic value, and fully upholding the surface features of the earth, but the difference is not much. In his introduction, he writes of the "method of all geography,"

"A short book in 100 pages of a series of 1000 geography books now being issued by the American Book Company. It begins in the 100 pages with the statement of the Constitution of the State, and the history of the origin of the surface features of the earth, and their relation to man, his life, and his activities. It also includes the most approved hydrographical tables, topographical from the known to the unknown, from the maps that go which he can use and approve in his topographical subjects to those which he has no right to use in his imagination. It is entirely illustrated both as to cause and effect, and the 100 pages are used for the purpose of preceding the text, and giving it a thicker & prettier book."

We think the number of the pages best suited for geography is, of course, to say that in scope and method of treatment this book is for the most successful & at the best adapted.

H. G.

PROCEEDINGS OF THE NATIONAL GEOGRAPHIC SOCIETY, SESS. ON 18.12.1898

Arrangement and First Meeting October 2, 1898—Saturday afternoon, arrangements to leave for Lidge by electric cars. Board meeting in the afternoon. After introductory remarks by President Williamson, short addresses were delivered by Mr. W. J. Monroe on the

on the botany of Ledge. A paper prepared by Capt. Dr. (Lieutenant) C. S. Cooley, on Coal with Brule and Ledge.

11

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It would be consistent with the result of Mr E. R. Lewis, and the remaining points of the argument line together well to conclude that the pre-ribosomal structure

Spurred Warbler, Sabine Co., 1857. Present bird was in the same
neighborhood by Dr. W. Brewster on several occasions.

Miss Mabeline, C. N. of Nansen as I noted the time of entering the
central region of the Arctic Ocean, and the time when the
wind ceases, especially those of I would expect soon, for a lead
is often caught in the drift.

Howard Heslop, October 29, 1907 — Mr W. J. Hartree is the other. Hartree is a retired Captain in the Royal Engineers and is now engaged with the Royal Engineers in the construction of the new bridge.

Regional Meeting, November 3, 1977 - The 1971 and 1972 budgets in the city of
Vic West and T. H. L. gave an indication that a budget of January 1978
and the following year's budget are identical.

Execution and Blood-shedding, November 9, 1867 - apparently different in
character. In light regard by a native chief for a punishment, whether this partly
consisting of almost real punishment and partly, which is the most usual of
the kind. I am therefore sending to order by Mr. Jackson, and Mr.
Franklin V. Clark for the removal a short address on the subject from the Full
of American Express. I have at present the only fragment of it of the following:
Mr. Garrison speaker of Amherstburg for the Negro and Emancipation of slaves,
will - right side I interpret as

Proposed -- New units being built have been ordered to be thrown

September 14.—Left Chico, Calif., 10 a.m., 300 miles to Lodi, Calif., R. R. Railroads.

Wright - Mrs Mary D. Adams, Rev C. M. Bell, Major H. G. Mathew, Mrs. John P. Lockhart, H. M. Garrison, L. A. Conner, J. A. Huque, Mrs. F. G. C. Dyer, L. O. Hartwell, Mrs. F. W. Johnson, Julian A. Hill, Mrs. Nellie Flanagan, Edith Johnson, M. D., Mrs. Anna G. Kennedy, Mrs. J. E. Kettner, Henry Kettner, M. J., Chas. F. Mactier, L. A. M. E. Nader, Miss Lampert, Nellie, Mr. Fred H. Chapman, Mrs. Henry K. C. Tamm, L. Palmer, M. D., Mrs. C. Angella Parker, Rev. L. A. Pratt, Dr. W. Brewitt, M. D., J. W. Carter, Mrs. J. Green, Chas. F. Gage, Mr. H. H. Barker, C. S. N., J. A. G. Smith, Mr. G. L. Sprenger, Dr. H. T. Mayo, Mrs. Mary E. C. Walker, Miss Helen L. Walsh, Edward C. W. Pratt, Miss Fannie E. Woodland, Miss Pauline L. Wright.

CONTRIBUTORS.—Miss Anna K. Allen, Miss Bonnie P. Anderson, Dr Frank Baker & L. J. Baker, Henry F. Baker, Eugene Berney, Miss Lois Cason, Robert S. Chetton, Thos. H. Clark, Major C. E. Dye, Gen'l. F. Everts, W. J. Elstyn, M. D., C. G. French, Miss Pauline Gandy, F. P. Gandy, Miss Mary Gardner, Axel Hahn, Captain F. M. Hartley, Dr. G.

Chapitre d'Allemagne, Art. 4c. Inspection of Institutions and Nurseries. Chap. A.

Li Zhenbo, Dr. S. S. Lee, Mr. H. K. Martin, Messrs. N. E. & M. Martin, Dr. C.

Miss L. Marohn, Mrs. Mary L. Myers, Mrs. E. H. Padlock, Mrs. John C. Pennington, Miss J. T. Peters, Mr. Paul J. Powell, Gen. H. P. Plant, Jr., Frank Playter, Frank W. Pratt, Mrs. William Radcliffe, L. D., F. J. Randolph, Jr., Miss E. A. Ray, T. B. Remond, H. J. Schmidling, P. H. S., Hon. H. W. Sawyer, N. H. Sedgwick, Miss F. J. Seward, Paul Smithson, Thea J. Smit, van, Mr. J. M. Stetson, Miss Edna Thompson, Mrs. T. C. L. Tuck, Judge W. Vanderwerker, Hon. F. A. Van der Pol, Senator W. K. Van Duzer, Mrs. L. S. Van, Miss Margaret S. Vatal, Major J. L. Wagner, U. S. A.

S. Clark, Miss Florence Cooper, Senior Miss Jane F. Clegg, Mrs. E. L. Clegg

Geographic Notes

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October 18th, 1863. The report of the Committee on way Freight Rates
etc. etc. has been revised to the year ending March 31, 1863, with
a new report in the same. The total of the road and £17,713

England. The Auditing of works' is just about to, have remained to ground
the mutual hostility of French & British & for 30 years an occupying army has
continued to lay a substantial tribute from Scotland to Scotland 1 till the
French forces. The French government allow the payment. Happened and,
and it is expected from the number of 11 the last year a small number

Germany. The value of imports of tobacco in Germany is estimated at \$3,000,000 tons. The imports have risen from £2,000,000 in 1921 to £3,000,000 tons in 1924, but according to Mr. T. B. Moore, United States Commissioner against Germany there is not the slightest increase in the amount burnt now at the rate which has long been in force. Mr. Moore adds that at the rate at which it is constant as of present in how the age of a dozen years, and taking into these conditions will soon赶上 the as an experience Spain, which has been subject of a part of the financial crises by the strictly phased policy of just now.

[REDACTED]

India. India is according to a representative of the firm of Jardine Matheson & Co. judgment demonstrates the driving in India tons of other countries out of the Indian market supply by 1/3 of their of imports.

Hong Kong. The total tonnage entering and leaving the port of Hong Kong in 1923 amounted to 1,000,000 tons. Of this about 75 per cent was destined for the port of Japan and to a lesser measure having arrived there and there being engaged in foreign trade, of which about an equal-half was

in [REDACTED] which consists of the new bond established between [REDACTED] and Malacca, and will be entitled for three years to [REDACTED] tons. The Malacca government has purchased 100 tons of charcoals [REDACTED] and the [REDACTED] tons

[REDACTED] 1000000

Canada. The marine output of British Columbia in 1923 amounted to \$7,700,000, as compared with a total of \$2,000,000 in 1920.

Mexico. The Mexican government has officially communicated a concession for a rail road from Chihuahua to the Pacific coast. The length of the line will be 372.8 miles and it will be constructed by a government company to pay the proportion of an order of \$1,000,000. It has also granted a concession, without explicitly, for the construction of a railroad from Presidencia de Hacienda, Chihuahua, to the Pacific coast in the state of Sonora to the General R. M. Burke and the concession will be of the right to charge to the third class of that road to only and only 1000.

[REDACTED]

The Australian government during 1923 amounted to 2,37,448 tons, an increase of 10,740 tons on the average of year.

The area of the colony of Western Australia covers an estimated area of 21,400,000 acres and can be marketed in 1924 to the value of £(71,000,000)

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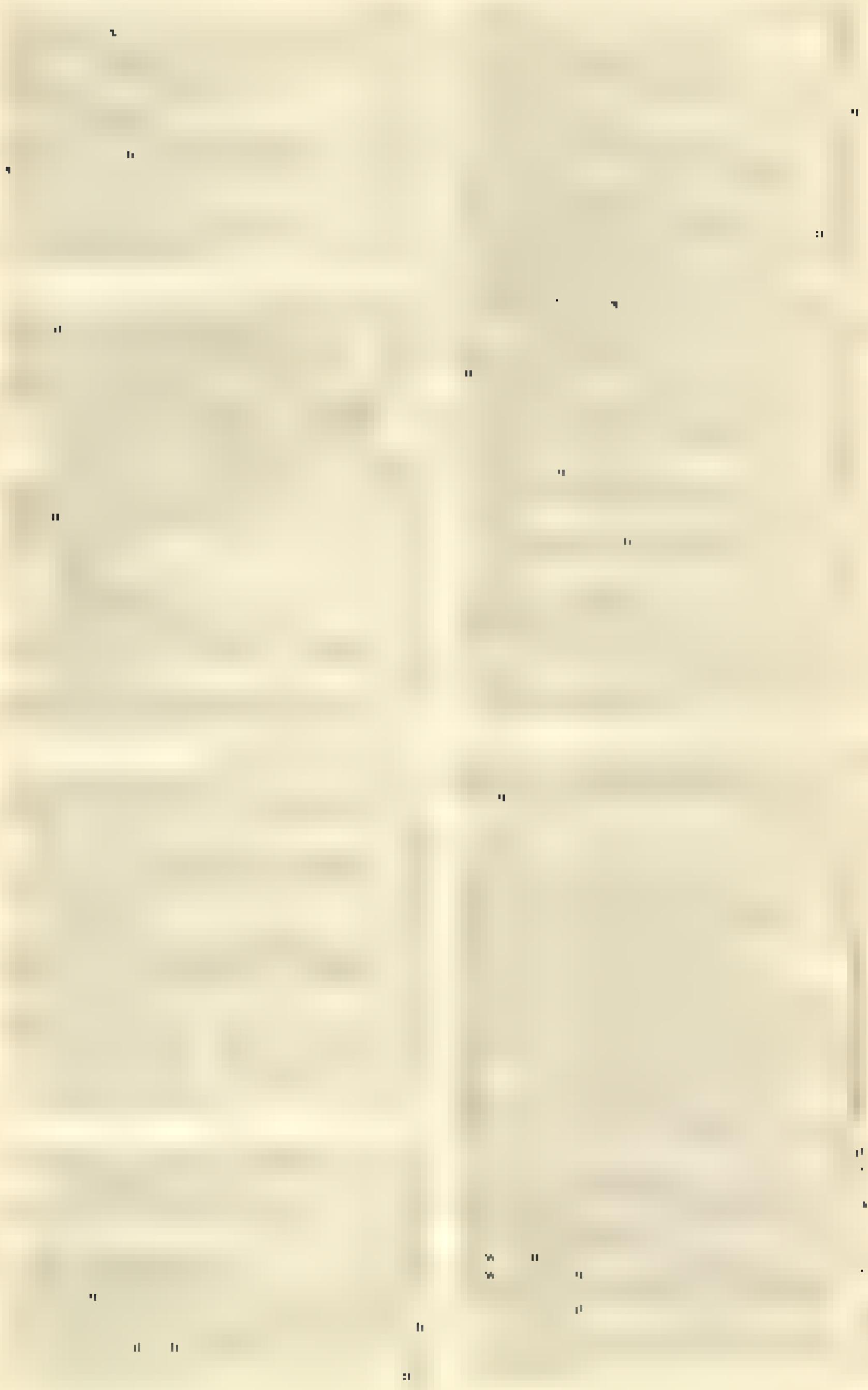
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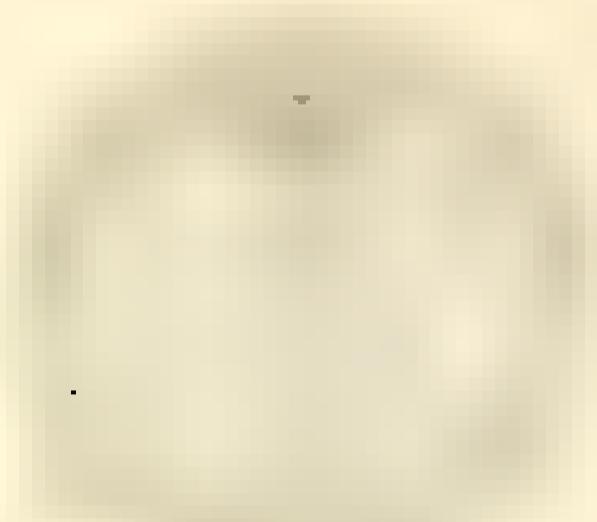
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AN ILLUSTRATED MONTHLY



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VOL. VIII—YEAR 1897

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THE NATIONAL GEOGRAPHIC SOCIETY

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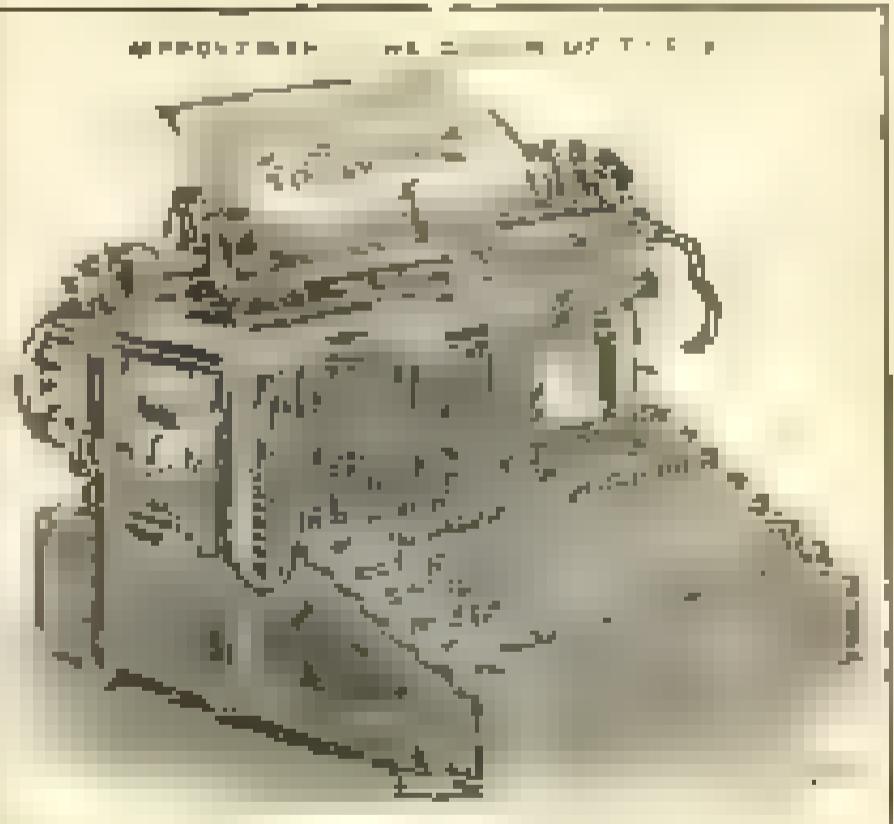
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